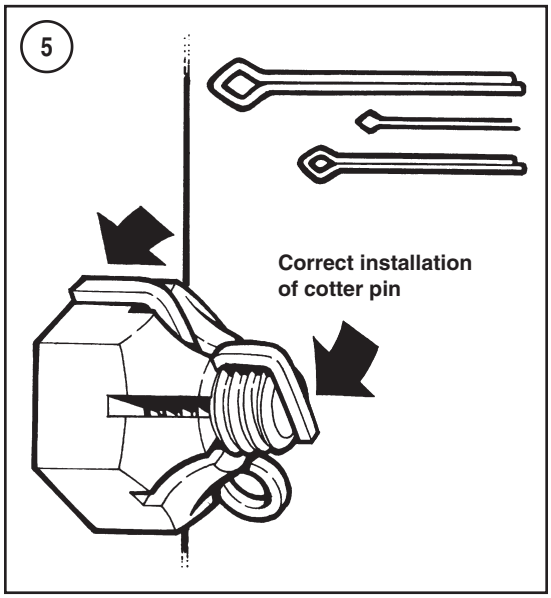


Torque Specifications

The materials used in the manufacture of a ATV may be subjected to uneven stresses if the fasteners of the various subassemblies are not installed and tightened correctly. Fasteners that are improperly installed or that work loose can cause extensive damage. Use an accurate torque wrench when tightening fasteners, and tighten each fastener to its specified torque.

Torque specifications for specific components appear at the end of the appropriate chapters. Specifications for torque are provided in Newton-meters (N•m), foot-pounds (ft.-lb.) and inch-pounds (in.-lb.). Refer to **Table 6** for torque conversion formulas and to **Table 5** for general torque specifications. To use **Table 5**, first determine the size of the fastener as described in *Fasteners* in this chapter. Locate that size fastener in **Table 5**, and tighten the fastener to the indicated torque. Torque wrenches are described in the *Basic Tools* section of this chapter.

Self-Locking Fasteners

Several types of bolts, screws and nuts use various means to create an interference between the threads of two fasteners. The most common types are the nylon-insert nut and a dry adhesive coating on the threads of a bolt.

Self-locking fasteners offer greater holding strength than standard fasteners, which improve their resistance to vibration. Most self-locking fasteners cannot be reused. The materials used to form the lock become distorted after the initial installation and removal. Always discard and replace self-locking fasteners after their removal. Do not replace self-locking fasteners with standard fasteners.

Washers

There are two basic types of washers: flat washers and lockwashers. Flat washers are simple discs with a hole for a screw or bolt. Lockwashers are used to prevent a fastener from working loose. Washers can be used as spacers and seals, to help distribute fastener load and to prevent the fastener from damaging the component.

When replacing washers, make sure the replacements are of the same design and quality as the originals.

Cotter Pins

A cotter pin is a split metal pin inserted into a hole or slot to prevent a fastener from working loose. In certain applications, such as the rear axle on an ATV or motorcycle, the fastener must be secured in this way. For these applications, a cotter pin and castellated (slotted) nut is used.

To use a cotter pin, first make sure the pin's diameter is correct for the hole in the fastener. After correctly tightening the fastener and aligning the holes, insert the cotter pin through the hole and bend the ends over the fastener (**Figure 5**). Unless instructed to do so, never loosen a torqued fastener to align the holes. If the holes do not align, tighten the fastener just enough to achieve alignment.

Cotter pins are available in various diameters and lengths. Measure length from the bottom of the head to the tip of the shortest pin.

Snap Rings

Snap rings (**Figure 6**) are circular-shaped metal retaining clips. They secure parts and gears onto shafts, pins or rods. External type snap rings are used to retain items on shafts. Internal type snap rings secure parts within housing bores. In some ap-

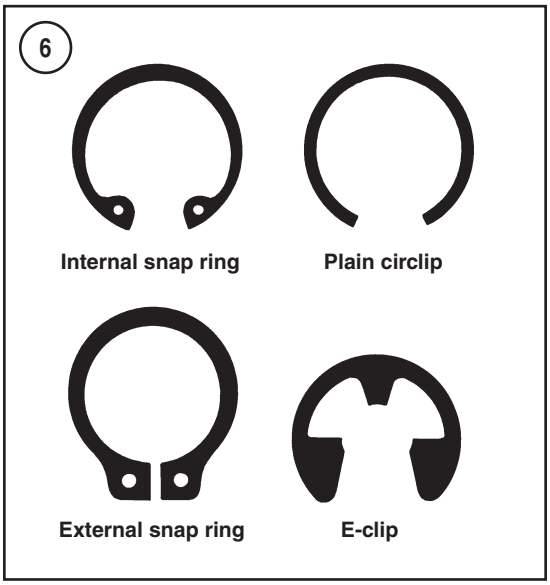
plications, in addition to securing the component(s), snap rings of varying thickness also determine end play. These are usually called selective snap rings.

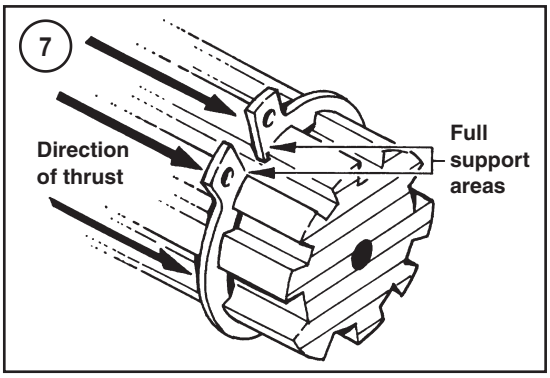
Two basic types of snap rings are used: machined and stamped snap rings. Machined snap rings (**Figure 7**) can be installed in either direction since both faces have sharp edges. Stamped snap rings (**Figure 8**) are manufactured with a sharp edge and a round edge. When installing a stamped snap ring in a thrust application, install the sharp edge facing away from the part producing the thrust.

E-clips are used when it is not practical to use a snap ring. Remove E-clips with a flat blade screwdriver by prying between the shaft and E-clip. To install an E-clip, center it over the shaft groove, and push or tap it into place.

Observe the following when installing snap rings:

1. Remove and install snap rings with snap ring pliers. See *Snap Ring Pliers* in this chapter.
2. In some applications, it may be necessary to replace snap rings after removing them.
3. Compress or expand snap rings only enough to install them. If overly expanded, they lose their retaining ability.
4. After installing a snap ring, make sure it seats completely.
5. Wear eye protection when removing and installing snap rings.





SHOP SUPPLIES

Lubricants and Fluids

Periodic lubrication helps ensure a long service life for any type of equipment. Using the correct type of lubricant is as important as performing the lubrication service, although in an emergency the wrong type of lubricant is better than none. The following section describes the types of lubricants most often required. Make sure to follow the manufacturer's recommendations for lubricant types.

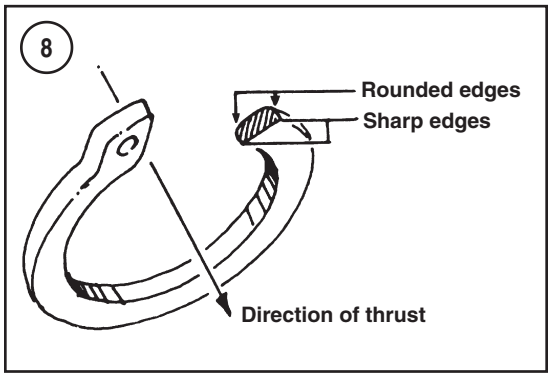
Engine oil

Engine oil is classified by two standards: the American Petroleum Institute (API) service classification and the Society of Automotive Engineers (SAE) viscosity rating. This information is on the oil container label. Two letters indicate the API service classification. The number or sequence of numbers and letter (10W-40 for example) is the oil's viscosity rating. The API service classification and the SAE viscosity index are not indications of oil quality.

The service classification indicates that the oil meets specific lubrication standards. The first letter in the classification (*S*) indicates that the oil is for gasoline engines. The second letter indicates the standard the oil satisfies.

Always use an oil with a classification recommended by the manufacturer. Using an oil with a different classification can cause engine damage.

Viscosity is an indication of the oil's thickness. Thin oils have a lower number while thick oils have



a higher number. Engine oils fall into the 5- to 50-weight range for single-grade oils.

Most manufacturers recommend multigrade oil. These oils perform efficiently across a wide range of operating conditions. Multigrade oils are identified by a (*W*) after the first number, which indicates the low-temperature viscosity.

Engine oils are most commonly mineral (petroleum) based; however, synthetic and semi-synthetic types are used more frequently. When selecting engine oil, follow the manufacturer's recommendation for type, classification and viscosity.

Greases

Grease is an oil to which a thickening base has been added so the end product is semi-solid. Grease is often classified by the type of thickener added, such as lithium soap. The National Lubricating Grease Institute (NLGI) grades grease. Grades range from No. 000 to No. 6, with No. 6 being the thickest. Typical multipurpose grease is NLGI No. 2. For specific applications, manufacturers may recommend water-resistant type grease or one with an additive such as molybdenum disulfide (MoS_2).

Brake fluid

Brake fluid is the hydraulic fluid used to transmit hydraulic pressure (force) to the wheel brakes. Brake fluid is classified by the Department of Transportation (DOT). Current designations for brake fluid are DOT 3, DOT 4 and DOT 5. This classification appears on the fluid container.

Each type of brake fluid has its own definite characteristics. Do not intermix different types of brake fluid. DOT 5 fluid is silicone-based. DOT 5 is not compatible with other fluids or in systems for which it was not designed. Mixing DOT 5 fluid with other fluids may cause brake system failure. When adding brake fluid, *only* use the fluid recommended by the ATV manufacturer.

Brake fluid will damage plastic, painted or plated surfaces. Use extreme care when working with brake fluid. Immediately wash any spills with soap and water. Rinse the area with plenty of clean water.

Hydraulic brake systems require clean and moisture-free brake fluid. Never reuse brake fluid. Brake fluid absorbs moisture, which greatly reduces its ability to perform correctly. Keep brake fluid containers and reservoirs properly sealed. Purchase brake fluid in small containers, and discard any small left-over quantities properly. Do not store a container of brake fluid with less than 1/4 of the fluid remaining. This small amount absorbs moisture very rapidly.

WARNING

Never put a mineral-based (petroleum) oil into the brake system. Mineral oil will cause rubber parts in the system to swell and break apart, resulting in complete brake failure.

Cleaners, Degreasers and Solvents

Many chemicals are available to remove oil, grease and other residue from the ATV. Before using cleaning solvents, consider how they will be used and disposed of, particularly if they are not water-soluble. Local ordinances may require special procedures for the disposal of various cleaning chemicals. Refer to *Safety* in this chapter for more information on their use.

Generally, degreasers are strong cleaners used to remove heavy accumulations of grease from engine and frame components.

Use brake parts cleaner to clean brake system components when contact with petroleum-based products will damage seals. Brake parts cleaner leaves no residue.

Use electrical contact cleaner to clean electrical connections and components without leaving any residue.

Carburetor cleaner is a powerful solvent used to remove fuel deposits and varnish from fuel system components. Use this cleaner carefully, as it may damage finishes.